Statistical Methods - Second Exams

*QUESTION (1):* Let be the number of children of a randomly chosen Jordanian family. Its probability distribution is as the following:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 |
|  | 0.2 | 0.1 | 0.3 | 0.25 | 0.1 | ?? |

1. What is ?

*QUESTION (2):* In a bag there 20000 coins, 500 of which are quarters. If you select 5 coins randomly, what is the probability that you get exactly 2 quarters in the following cases:

1. With replacement? 2) Without replacement?

*QUESTION (3):* Let and be two events such that , Find:

*QUESTION (4):* [4 marks] (1) Let X = the number of typing errors per page of a book is Poisson distribution with standard deviation 3. Find:



(2) [2 marks] Products produced by a machine has a 3% defective rate, what is the probability that the first defective occurs in the fifth item inspected?

(3) [2 marks] The probability of a man hitting the target at a shooting range is . If he shoots 10 times, what is the probability that he hits the target exactly three times? What is the probability that he hits the target at least once?

*Question (1):* 1) Find if

2) A class consists of 60% men and 40% women. Of the men, 25% are blond, while 45% of the women are blond. If a student is chosen at random and found to be blond, what is the probability that student is man?

*Question (2):* 1) Let be the number of children of a randomly chosen Jordanian family. Its probability distribution is as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Values of | 0 | 1 | 2 | 3 | 4 | 5 |
| Probability | 0.2 | 0.1 | 0.3 | 0.25 | 0.1 | ?? |

Calculate the following:

2) The number of telephone calls that arrive at a phone exchange is a random variable that follows a Poisson distribution. The expected number of calls per hour at the exchange is 6. What is the probability that the exchange gets at least 1 call in the next hour?

*Question (3):* 1) A salesman makes ten calls a day. The probability that he makes a sale on any call is 0.4. Success on any call is independent of success on any other calls.

1. What is the probability that he makes two sales in a given day?
2. What is the probability that he makes at least two sales in a given day?

2) A box contains 20 items of which 10% are defective. Find the probability that no more than 2 defectives will be obtained in a sample of size 10 in the following cases:

1. With replacement
2. Without replacement

***QUESTION (1):*** Suppose and are events such that

. What is ?

***QUESTION (2):*** The following is a probability distribution for a discrete random variable .

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | -1 | 0 | 1 | 10 |
|  | 0.2 | 0.5 | 0.2 | 0.1 |

Find:

1)

2) The expected value of

3) The standard deviation of

***QUESTION (3):*** In a survey of 250 juniors majoring in psychology or communications at a large university, the students were asked whether or not they are happy with their majors. The following table gives the result of the survey. Assume that none of these students major in both areas.

|  |  |  |
| --- | --- | --- |
|  | Happy | Unhappy |
| Psychology | 80 | 20 |
| Communications | 115 | 35 |

1. What is the probability that a randomly selected student from this group is happy with the choice of the major?
2. What is the probability that a randomly selected student from this group is neither happy with the choice of the major nor is a psychology major?
3. What is the probability that a randomly selected student from this group is unhappy with the choice of major or is a communications major?

***QUESTION (1):***  A class contains 8 boys and 7 girls. The teacher selects 3 of the children at random and without replacement. Calculate the probability that the number of boys selected exceeds the number of girls selected.

***QUESTION (2):*** The following is a probability distribution for a discrete random variable .

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | 0.04 | 0.16 | 0.18 | *k* | 0.14 | 0.17 | 0.09 | 0.03 |

Find:

1) The constant *k.*

2) The expected value of

***QUESTION (3):*** Randomly selected an American household, and let A be the event that the selected household is prosperous and B be the event that it is educated, where *P(A) = 0.15, P(B) = 0.28*, and *P(A and B) = 0.05.*

1. What is the probability that the household selected is either prosperous or educated?
2. What is the probability that a household is prosperous, given that it is educated?
3. What is the probability that a household is educated, given that it is prosperous?
4. Is the two events A and B are independent?

***Question (1):* (4 points)** In a survey, 510 adults were asked if they drive a pickup truck and if they drive a Ford. The results showed that 85 adults surveyed drives a pickup truck, and 153 adults surveyed drive a Ford. Of the adults surveyed that drive Fords, 34 drive a pickup truck.

(a) Find the probability that a randomly selected adult drives a pickup truck, given that the adult drives a Ford.

(b) Find the probability that a randomly selected adult drives a Ford or drives a pickup truck.

(c) Find the probability that a randomly selected adult does not drive a Ford or pickup truck.

***Question (2):* (5 points)** Assume that . Find .

***Question (4):* (4 points)** A shipment of 10 microwave ovens contains two defective units. What is the probability of the restaurant buying:

(a) no defective units?

(b) three defective units?

(c) at least two non-defective units?

***Question (5):* (7 points)** Twenty-eight percent of college students say they use credit cards because of the rewards program. You randomly select 10 college students and ask them to name the reason they use credit cards. Find the probability that the number of college students who say they use credit cards because of the rewards program is:

(a) exactly two

(b) more than two

(c) between two and five

(d) the expected value

***Question (6):* (5 points)** A 911 service center recorded the number of calls received per hour. The random variable *x* represents the number of calls per hour for one week.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | 0.01 | 0.1 | ?? | 0.33 | 0.18 | 0.06 | 0.03 | 0.03 |

Find:

1. the missing entry.
2. the variance.